IN THE CLAIMS:

Claims 1-9 (canceled)

10. (New) A method for producing an improved catalyst, said method comprising:

(a) providing a first catalyst generation comprising a plurality of mixed catalysts, each said mixed catalyst comprising a plurality of components;

(b) measuring at least one performance parameter for each catalyst of said first catalyst generation;

(c) preparing a second catalyst generation by restructuring the catalysts of said first generation by a pre-determined number of processes comprising crossing or mutation or both, performed in any order;

(d) repeating steps (a) and (b) for a pre-determined number of generations or until no definite improvement in catalytic properties is observed within a generation, wherein each second catalyst generation provides the first catalyst generation of a subsequent generation,

wherein said crossing process comprises the steps of:

(i) ranking said first catalyst generation according to said at least one performance parameter;

(ii) selecting a first mixed catalyst using a numerical random generator having a uniform distribution;

(iii) selecting a second mixed catalyst with a probability Wi using a numerical random generator having a uniform distribution, wherein Wi is determined according to the formula:

$$W_i = \frac{\left(\sum_{j=1}^{n} j\right) - i}{\left(\sum_{j=1}^{n} j\right)}$$

wherein i and j denote said ranking in order of decreasing performance, and n denotes the number of catalysts in said first catalyst generation;

(iv) selecting from said first and second mixed catalysts a first component that is present in only one of said first and second mixed catalysts using a numerical random generator having a uniform distribution; and

(v) crossing said first and second catalyst by removing said first component from said first or second catalyst having said first component, and adding said first component to said first or second catalyst lacking said first component;

and wherein said mutation process comprises the steps of:

(vi) selecting a third mixed catalyst using a numerical random generator having a uniform distribution;

(vii) selecting a component of said third mixed catalyst using a numerical random generator having a uniform distribution; and

(viii) mutating said third mixed catalyst by adding said component if said third mixed catalyst lacks said component, or removing said component if said third mixed catalyst has said first component.

11. (New) The method of claim 10, wherein said pre-determined number of generations is between about 5 and about 50.

12. (New) The method of claim 10, wherein the number of said components in the mixed catalysts of said first catalyst generation is between about 3 and about 30.

13. (New) The method of claim 12, wherein the number of said components in the mixed catalysts of said first catalyst generation is between about 3 and about 10.

14. (New) The method of claim 10, wherein said at least one performance parameter of said catalyst is determined by

contacting said catalyst with a gas stream, wherein the composition of the gas stream is varied.

15. (New) The method of claim 10, wherein the gas stream has a space velocity, and wherein the space velocity of the gas is varied based on the catalyst mass in determining said performance parameters of said catalysts.

16. (New) The method of claim 10, wherein the temperature of said catalyst is varied in the determination of said performance parameters of said catalysts.

17. (New) The method of claim 14, wherein the composition of the catalyst, the space velocity of the gas based on the catalyst mass, and the temperature, are varied according to the principles of mutation and crossing to determine the performance parameters of the newly structured material compositions of the next generations.